Attachment 8

Coachella Valley Integrated Regional Water Management Implementation Grant Proposal

Water Quality and Other Expected Benefits

Attachment 8 consists of the following items:

- ✓ **Water Quality and Other Expected Benefits**

  The body of this attachment provides an overview of the water quality and other expected benefits of this proposed funding package, as well as the benefits associated with each individual project.

- ✓ **Appendix 8-1**

  Appendix 8-1 of this attachment contains information regarding the qualitative and quantitative non-water supply benefits of each individual project contained within this Implementation Grant Proposal.

This attachment provides information regarding benefits that may be derived from projects within this *Coachella Valley IRWM Implementation Grant Proposal*, which extend beyond the water supply benefits described in Attachment 7. Table 8-1 below contains a summary of the costs and benefits for all projects.

Section 1 provides a summary of the regional water quality background of Coachella Valley.

Section 2 contains a narrative description of the expected water quality and other benefits of each project. Where possible, each benefit was quantified and presented in physical or economic terms. In cases where quantitative analyses were not feasible, this attachment provides complimentary qualitative analyses. In addition, this attachment provides a description of economic factors that may affect or qualify the amount of economic benefits to be realized. This attachment also includes a discussion regarding uncertainties about the future that might affect the level of benefit received. Appendix 8-1 contains detailed information regarding the benefits anticipated to occur as a result of this proposal.

Table 8-1: Water Quality and Other Costs and Benefits Summary

#	Project	Project Sponsor	Total Present Value Project Costs	Total Present Value Water Quality and Other Benefits
1	Regional Water Conservation Program	Coachella Valley Water District	$1,188,352	$6,544,473
2	Short Term Arsenic Treatment Project	Pueblo Unido Community Development Corporation	$913,459	N/A
3	Groundwater Quality Protection Program – Desert Hot Springs	Mission Springs Water District	$2,764,463	$75,208,333
4	Groundwater Quality Protection Program – Cathedral City	City of Cathedral City	$1,760,282	$861,593
		TOTAL	**$6,626,556**	**$82,614,399**

1 Regional Water Quality Background

Groundwater supply from the Coachella Valley Groundwater Basin is generally of high quality. In addition, disinfection is regularly provided as a precautionary measure before distribution for potable uses. However, groundwater quality issues have arisen in isolated areas throughout the Valley. Naturally occurring substances such as uranium, arsenic, and fluoride have been detected, and are likely due to natural geologic conditions. Further, some localized areas have also seen elevated nitrate levels. Representatives of DAC and tribal organizations report that groundwater supplies for some mobile home park communities within the East Valley have arsenic concentrations that exceed the MCL of 10 ppm.

2 Water Quality and Other Benefits of Proposed Projects

The following sections provide information about the water quality and other benefits associated with each proposed project within this *Coachella Valley IRWM Implementation Grant Proposal*. The summary of total project costs is based on Table 16 in DWR's Implementation Grant Proposal Solicitation Package (DWR 2010). Appendix 8-1 contains the complete Table 16 exports for each proposed project.

The projects within this proposal are anticipated to result in significant water quality and other benefits to the region. Three projects specifically focus on water quality benefits (*Short Term Arsenic Treatment Project, Groundwater Quality Protection Program –Desert Hot Springs, and Groundwater Quality Protection Program – Cathedral City.)* While these projects are anticipated to directly result in significant water quality benefits, the remaining project would also have indirect or complementary benefits to the region's water quality.

Project 1: Regional Water Conservation Program

The water quality and other benefits that are anticipated to result from implementation of the *Regional Water Conservation Program* are summarized below in Table 8-2 and the cost-benefit overview is presented in Table 8-3. This program would result in monetized water quality benefits as well as qualitative water quality and other benefits. Detailed cost and benefit information associated with the program, including present value calculations, are provided in Appendix 8-1.

Table 8-2: Water Quality and Other Benefits Summary
Regional Water Conservation Program

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Avoided Wastewater Treatment Costs	Monetized	Local
Water Quality Improvements Related to Beneficial Uses	Physically Quantified	Local and Regional
Ecosystem Improvements	Qualitative	Local, Regional, and Statewide
Power Cost Savings	Physically Quantified	Local, Regional, and Statewide

Table 8-3: Water Quality and Other Benefit-Cost Overview
Regional Water Conservation Program

	Present Value ($2009)
Costs – Total Capital and O&M	**$1,188,352**
Monetizable Benefits	
Avoided Wastewater Treatment Costs	**$6,544,473**
Qualitative Benefits	**Qualitative Indicator***
Water Quality Improvements to Beneficial Uses	+
Ecosystem Improvements	+
Power Cost Savings	+

Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If the *Regional Water Conservation Program* were not implemented, the Coachella Valley would continue to have similar water use demands as it currently has. In result, the Coachella Valley would continue to generate current levels of wastewater flow and associated need for wastewater treatment. Further, as growth and development continue, urban water consumption at current rates would contribute to increasing groundwater overdraft and associated groundwater quality degradation. For more information regarding the without project baseline used to determine water supply benefits, please refer to Attachment 7.

Water Quality and Other Benefits

The *Regional Water Conservation Program* would result in several water quality and other benefits. Detailed cost and benefit information associated with the program, including present value calculations, is provided in Appendix 8-1. A summary and discussion of these benefits are presented below.

Avoided Wastewater Treatment Costs

The *Regional Water Conservation Program*, by reducing water use, would also reduce the need for wastewater treatment. The volume of wastewater anticipated to no longer need treatment at a local wastewater treatment plant is based on the quantity of water conservation generated by the program. It is estimated that approximately 30 percent of water used is for indoor purposes that create wastewater treatment needs. As such, 30 percent of the water that is saved due to water conservation would not be subject to wastewater treatment. Based on recent operational and maintenance data, CVWD estimated that wastewater treatment costs are approximately $270/AF, and that cost is expected to stay relatively constant over time. As such, the total avoided wastewater treatment costs associated with the program are estimated to be $6,544,473 over the 49 year lifetime of the program (from 2012 to 2060). Table 8-4 provided a summary of these avoided wastewater treatment costs.

Table 8-4: Avoided Wastewater Treatment Costs
Regional Water Conservation Program

Year	Annual Water Savings from Conservation (AFY)	Wastewater Savings (65% of Conservation Savings) (AFY)	Unit Cost (per AF)	Years	Total Cost
2012	3,133	994	$270	1	$268,313
2013-2032	6,625	1,988	$270	20	$10,732,500
2033	6,388	1,917	$270	1	$517,460
2034	6,152	1,846	$270	1	$498,295
2035	5,915	1,775	$270	1	$479,129
2036	5,679	1,704	$270	1	$459,964
2037	5,442	1,633	$270	1	$440,799
2038	5,205	1,562	$270	1	$421,634
2039	4,969	1,491	$270	1	$402,469
2040	4,732	1,420	$270	1	$383,304
2041	4,496	1,349	$270	1	$364,138
2042	4,259	1,278	$270	1	$344,973
2043	4,022	1,207	$270	1	$325,808
2044	3,786	1,136	$270	1	$306,643
2045	3,549	1,065	$270	1	$287,478
2046	3,313	994	$270	1	$268,313
2047	3,076	923	$270	1	$249,147
2048	2,839	852	$270	1	$229,982
2049	2,603	781	$270	1	$210,817
2050	2,366	710	$270	1	$191,652
2051	2,129	639	$270	1	$172,487
2052	1,893	568	$270	1	$153,321
2053	1,656	497	$270	1	$134,156
2054	1,420	426	$270	1	$114,991
2055	1,183	355	$270	1	$95,826
2056	946	284	$270	1	$76,661
2057	710	213	$270	1	$57,496
2058	473	142	$270	1	$38,330
2059	237	71	$270	1	$19,165
2060	0	0	$270	1	$0
Total Avoided Wastewater Costs after Discounting				**$6,544,473**	

Note: For further information regarding how these numbers were calculated, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits.

Water Quality Improvements to Beneficial Uses

The *Regional Water Conservation Program* would also reduce agricultural and urban irrigation, and therefore potentially reduce surface runoff. Runoff in agricultural and urban areas can potentially contain chemical fertilizers, pesticides, and bacteria that can have a deleterious impact on the water-related local environment. Therefore, this program would potentially provide water quality improvements to beneficial uses associated with the water-related local environment. Based on previous experience from the agencies

participating in the *Regional Water Conservation Program*, it is estimated that this conservation program would potentially reduce runoff by 5 percent. This benefit has not been monetized.

Ecosystem Improvements

The Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) addresses issues regarding water needs for habitat preservation within the Coachella Valley. Specifically, this plan mentions that groundwater draw-down can potentially impact the ability of certain plants to hold and release sand, thereby resulting in erosion and habitat degradation. This program would reduce water demand, and would therefore potentially prevent groundwater draw-down throughout the Coachella Valley. As a result, this program could potentially help to preserve the habitat of species identified in the CVMSHCP. This benefit has not been quantified and/or monetized.

Power Cost Savings

As detailed in Attachment 7, water conservation anticipated as part of the program would future reduce regional water demand, thereby reducing the Coachella Valley region's future dependence on imported water from the Metropolitan Water District of Southern California (MWD). Reducing future dependence on imported water would potentially produce energy consumptive activities such as transporting, pumping, and treating imported or ground water supplies. Based on previous experience from the agencies participating in the *Regional Water Conservation Program*, it is estimated that this conservation program would potentially reduce power costs by 5 percent annually. This benefit has not been monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-5 summarizes the anticipated beneficiaries of water quality and other benefits that would be provided by this program. A reduction in wastewater treatment costs could result in lower wastewater rates for local ratepayers. Power cost savings would benefit local electricity ratepayers and reduce regional and statewide demand for power resources. Water quality and ecosystem improvements would benefit society as a whole, including local, regional, and statewide residents.

Table 8-5: Water Quality and Other Benefits Beneficiaries Summary
Regional Water Conservation Program

Local	Regional	Statewide
Local residents, including wastewater and electricity rate payers	Regional residents	Statewide residents

Project Benefits Timeline Description

All water quality and other benefits expected as a result of implementation of the *Regional Water Conservation Program* would occur over the 49 year lifetime of the program (from 2012 to 2060).

Potential Adverse Effects from the Project

No short-term or long-term adverse effects are expected as a result of this program.

Uncertainty of Benefits

Uncertainties relating to the water quality and other benefits of the program are summarized below in Table 8-6.

Table 8-6: Omissions, Biases, and Uncertainties and their Effect on the Project
Regional Water Conservation Program

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Avoided Wastewater Treatment Costs	-	The proportion of conserved water assumed to result in wastewater flows is assumed at 65%; however, the proportion of water supply used for outdoor irrigation varies by agency and may impact the avoided cost projections.
Water Quality Improvements to Beneficial Uses	+/-	Not monetized.
Ecosystem Improvements	+/-	Not monetized.
Power Cost Savings	+/-	Not monetized.

* Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 2: Short Term Arsenic Treatment Program

The water quality and other benefits that are anticipated to result from implementation of the *Short Term Arsenic Treatment Project* are summarized below in Table 8-7 and the cost-benefit overview is summarized in Table 8-8. This project would result in physically quantified water quality benefits and qualitative other benefits. Detailed cost and benefit information associated with the Project, including present value calculations, is provided in Appendix 8-1.

Table 8-7: Water Quality and Other Benefits Summary
Short Term Arsenic Treatment Project

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Water Quality Improvements (Reduced Arsenic Levels)	Physical Quantification	Local
Human Health Benefits	Qualitative	Local
Avoided Fuel Purchases	Qualitative	Local

Table 8-8: Short Term Arsenic Treatment Project Benefit-Cost Overview
Short Term Arsenic Treatment Project

	Present Value ($2009)
Costs – Total Capital and O&M	**$913,459**
Monetizable Benefits	
N/A	N/A
Qualitative Benefits	**Qualitative Indicator***
Water Quality Improvements **(**Reduced Arsenic Levels)	+
Human Health Benefits	+
Avoided Fuel Purchases	+

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If this project were not implemented, there would be continued and potential further negative impacts associated with arsenic contamination in the drinking water supplies of various DACs within Eastern Coachella Valley. In addition, without this project, benefits associated with avoided water costs, reduced arsenic levels, human health benefits, and avoided fuel purchases would not be realized.

Water Quality and Other Benefits

The proposed Project would provide several water quality and other benefits. A summary and discussion of these benefits are presented below.

Reduced Arsenic Levels

This project would include installation of point-of-entry and point-of use reverse osmosis systems to address arsenic-related water quality issues in various pockets of disadvantaged communities within Eastern Coachella Valley. This project is a replication and extension of an existing pilot project that occurred at the St. Anthony of the Desert Mobile Home Park. Through water quality testing and analysis, the St. Anthony of the Desert pilot project was demonstrated to be effective in removing arsenic from drinking water supplies

Arsenic levels in some wells within the project area have been reported as 16 to 50 parts per billion (ppb). Information from the St. Anthony of the Desert pilot project suggests that with the project, projected arsenic levels after implementation would be reduced to less than 10 ppb. Benefits associated with reducing arsenic levels would accrue from 2012 to 2031. However, these benefits have not been monetized.

Human Health Benefits

The U.S. Environmental Protection Agency (EPA) has developed cost estimates for health effects in association with their reduction in the maximum containment level (MCL) standard for arsenic. According to the EPA, dropping their MCL standard for arsenic from 50 to 10 µg/L will protect approximately 13 million Americans that are served by community water systems (CWSs) and Non-Transient Non-Community Water Systems (NTNCWSs). The EPA also notes that reducing arsenic standards from 50 to 10 µg/L will prevent approximately 19 to 31 cases of bladder cancer and 5 to 8 deaths due to bladder cancer per year. In addition, the EPA estimates that this reduction in the standard will prevent approximately 19 to 25 cases of lung cancer and 16 to 22 deaths due to lung cancer per year. In addition to these quantified benefits, there are substantial non-quantified benefits associated with reducing arsenic MCL standards, including reducing the incidences of non-cancerous effects summarized above.[1]

According to the EPA, the annual monetized benefits associated with reducing the MCL standard for arsenic from 50 to 10 µg/L range from $140 to $198 million. These estimates reflect the upper and lower bound of the risk range addressed by this MCL standard change, as well as the drinking water consumption distributions that were used in the analysis of this project. This benefit, as it relates to the project, has not been quantified or monetized.

Avoided Fuel Purchases

As described in Attachment 7, this project would provide benefits associated with avoided costs of bottled water purchases. This benefit would be associated with avoided fuel purchases, because by reducing and/or eliminating the need for bottled water purchases travel needs required to purchase and transfer bottled

[1] http://water.epa.gov/lawsregs/rulesregs/sdwa/arsenic/regulations_techfactsheet.cfm
http://water.epa.gov/lawsregs/rulesregs/sdwa/arsenic/regulations_factsheet.cfm

water would also be reduced and/or eliminated. Therefore, the project would reduce costs associated with fuel purchases.

Current gas costs average $3.00 per gallon. The geographical location of bottled water supplies varies, but is estimated to be approximately three miles for residents within the project area. Costs associated with fuel purchases can be very costly for disadvantaged communities, and therefore can substantially increase their water supply costs. While this benefit may be substantial, it was not quantified or monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-9 summarizes the anticipated beneficiaries of water quality and other benefits that would be provided by the Project. The water quality and other benefits would be anticipated on a local level to local residents using groundwater treated by the project.

Table 8-9: Project Beneficiaries Summary
Short Term Arsenic Treatment Project

Local	Regional	Statewide
Local residents	*Not Applicable*	*Not Applicable*

Project Benefits Timeline Description

Benefits associated with reducing arsenic levels would accrue from 2012 to 2031. Other benefits have not been quantified or monetized and therefore, do not have associated project benefits timelines.

Uncertainty of Benefits

As demonstrated in Table 8-10 below, uncertainties relating to water quality and other benefits are associated with the fact that these benefits were not monetized.

Table 8-10: Omissions, Biases, and Uncertainties and their Effect on the Project
Short Term Arsenic Treatment Project

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Reduced arsenic levels	+	Not monetized.
Human health benefits	++	There are substantial non-quantified health benefits associated with reduced arsenic levels.
Avoided fuel purchases	+	Not monetized.

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 3: Groundwater Quality Protection Program - Desert Hot Springs

The water quality and other benefits that are anticipated to result from implementation of the *Groundwater Quality Protection Program – Desert Hot Springs* are summarized below in Table 8-11 and the cost-benefit overview is presented in Table 8-12. This program would result in monetized water quality and other benefits, as well as physically quantitative water quality benefits. Detailed cost and benefit information associated with the program, including present value calculations, are in Appendix 8-1.

Table 8-11: Water Quality and Other Benefits Summary
Groundwater Quality Protection Program - Desert Hot Springs

Type of Benefit	Assessment Level	Beneficiaries
Water Quality		
Avoided costs to septic tank owners	Monetized	Local
Avoided well treatment costs	Monetized	Local and regional
Water quality improvements that protect beneficial uses	Physical Quantification	Local and Regional
Other Benefits		
Avoided loss of hotel revenues	Monetized	Local and regional
Avoided loss of tax revenue	Monetized	Local and regional

Table 8-12: Water Quality and Other Benefit-Cost Overview
Groundwater Quality Protection Program - Desert Hot Springs

	Present Value ($2009)
Costs – Total Capital and O&M	**$2,764,463**
Monetizable Benefits	
Avoided costs to septic tank owners	$1,156,398
Avoided well treatment costs	$5,816,287
Avoided loss of hotel revenues	$60,924,686
Avoided loss of hotel tax revenue	$7,310,962
Total	**$75,208,333**
Qualitative Benefits	**Qualitative Indicator***
Protecting beneficial uses	+

* Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If this project were not implemented, there would be continued and potential further negative impacts associated with failing and/or densely located septic systems within the project area. In total, the project area contains ten production wells with an average production capacity of 10,000 AFY. To date, two of these wells have already been contaminated with nitrate, and their annual production is approximately 2,900 AFY. Without this project, the nitrate contamination from the septic tanks would spread to the other wells in the sub-basin and over time, could potentially migrate downstream to the entire Coachella Valley since the Desert Hot Springs Sub-Basin sits higher in elevation to and drains into the other larger sub-basins.

Water Quality & Other Benefits

The proposed project would provide several water quality and other benefits. These benefits are described in detail below and are summarized in Table 8-11.

Avoided Costs to Septic Tank Owners

The *Groundwater Quality Protection Program – Desert Hot Springs*, by replacing septic systems with sewer connections, would eliminate costs to septic tank owners associated with operations, maintenance, and replacement costs of septic tanks. The proposed project area (Sub-area D-1) is included as part of a larger project area, Assessment District 12 (AD-12). Of the 6,000 septic tanks in Area AD-12, Sub-area D-

1 will constitute 183 septic tanks that would be converted over to sewer systems and subject to the following avoided costs.

Information from MSWD shows that for 183 septic systems, the annualized maintenance costs are estimated to be $500 for pumping every three to five years, with an average maintenance cost of $125 per year. In addition, MSWD data demonstrates that replacement costs average $10,000 over a 25-year period, or approximately $400 per year. In total the annualized costs to each septic tank owner is the summation of annual maintenance costs ($125) and annual replacement costs ($400) for a total of $525 per year. This project would replace 183 septic tanks, therefore resulting in an annualized avoided cost of $96,075 per year ($525 x 183).

In addition to the avoided costs, however, the project would also result in costs to septic tank owners associated with a one-time abatement cost for customers to connect to the wastewater collection system. Please note that these costs would be required, because mandates from the Colorado River RWQCB and MSWD require that customers connect to wastewater collection systems once they are available to their property. This one-time abatement cost would be $5,000, but would be annualized over the same time period as the avoided costs noted above (50 years) for an annual total of $100 per year. This project would replace 183 septic tanks, therefore resulting in an annualized cost of $18,300 per year ($100 x 183).

In sum, annualized avoided costs to septic tank owners would be $96,075 per year (for avoided O&M) minus $18,300 per year (for abatement), for a total of $77,775 per year. It is anticipated that these annual benefits would begin in 2011 and end in 2060. After discounting, this total benefit is estimated to be $1,156,398 over the lifetime of the project as shown in Table 8-13.

Table 8-13: Avoided Costs to Septic Tank Owners
Groundwater Quality Protection Program - Desert Hot Springs

	Annual Cost per Unit	Number of Units	Years	Total Cost
Avoided Maintenance Costs	$125	183	50	$1,143,750
Avoided Replacement Costs	$400	183	50	$3,660,000
Subtotal Avoided Costs to Septic Tank Owners				**$5,073,750**
Abatement Costs	$100	183	50	$915,000
Subtotal Retained Costs to Septic Tank Owners				**$915,000**
Total Avoided Costs to Septic Tank Owners (Delta)				**$4,158,750**
Total Avoided Costs to Septic Tank Owners after Discounting				**$1,156,398**

Note: For further information regarding how these costs were reached, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Avoided Well Treatment Costs

The *Groundwater Quality Protection Program – Desert Hot Springs*, by eliminating a nitrate source within the project area, would potentially reduce or eliminate the need to conduct well treatment for nitrate removal. This project attribute would generate an economic benefit associated with avoided well treatment costs.

MSWD has two wells within its service area that are already contaminated with nitrates. The cost assessments below represent figures from an independent consultant who calculated the costs necessary to treat those two contaminated wells. This information demonstrates that materials and labor costs associated with well treatment would be $288,000 per year for materials and $40,000 per year for labor, for a total of $328,000 per year for O&M costs. These estimates also indicate that there is an annual depreciation/replacement cost of $42,900 per year, which is associated with the initial capital cost of $857,000. These depreciation/replacement costs were assumed to occur over a 20-year period. In total,

well treatment costs were calculated to be $370,900 per year ($328,000 + $42,900). All of the aforementioned costs were assumed for an individual well with a capacity of 2,900 AFY. Therefore, the total economic benefit associated with well treatment costs would be $127.90 per AF ($370,900 per year/2,900/AFY).

The consultant estimates were based on well treatment costs that would be necessary to address contamination in two MSWD wells with a combined 3,500 gpm capacity and a total annual production of 2,900 AFY in 2009. In total, MSWD has ten production wells in the Desert Hot Springs Sub-basin (within the project area), including the two that have previously been contaminated. Together, these ten wells have an average annual capacity of 10,000 AFY.

This project is not proposing to treat the two contaminated wells, rather to protect the remaining eight from becoming contaminated. Therefore, this benefit analysis assumes that without the project, the remaining eight wells (7,100 AFY) would eventually become contaminated. Avoided costs for treatment of these eight wells would not likely occur immediately or simultaneously. Therefore, as part of this analysis, it was assumed that only two wells would be contaminated every five years, starting in 2016. These avoided well treatment costs only apply to the eight remaining wells in the Desert Hot Springs Sub-basin and do not account for the potential contamination and treatment that could be required if the contamination continued down gradient to the larger sub-basins in the East Valley.

After discounting, and assuming that the aforementioned benefits accrue from 2011 to 2060, the total benefits associated with well treatment costs would be $5,816,287 over the lifetime of the project as shown in Table 8-14.

Table 8-14: Avoided Well Treatment Costs
Groundwater Quality Protection Program - Desert Hot Springs

	Annual Reduction (AF)	Unit Value ($/AF)	Years	Total Cost
Avoided Well Treatment Costs	7,100	$128	50	$32,231,980
Total Avoided Well Treatment Costs after Discounting				**$5,816,287**

Note: For further information regarding how these costs were reached, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Water Quality Improvements that Protect Beneficial Uses

Effluent from septic tanks is known to contain relatively high concentrations of nitrite, nitrate, and ammonia nitrogen, which can leach into the local groundwater, thereby causing increased nitrate concentrations in groundwater. This project would protect the local groundwater from septic tank effluent leaching, thus protecting the beneficial use of drinking water within and adjacent to the project area.

For purposes of this analysis, it was assumed that average production for all ten MSWD wells in the Desert Hot Springs Subbasin is 10,000 AFY. Two wells within this subbasin are already contaminated with nitrates, and together they produce 2,900 AFY. This project intends to protect the remaining 7,100 AFY of uncontaminated well water within the project area, thereby protecting 7,100 AFY of a beneficial use. This benefit has not been monetized.

Avoided Loss of Hotel Revenue

The Desert Hot Springs Sub-basin, within which the project lies, contains natural hot springs. The Desert Hot Springs community contains an estimated 22 businesses that are marketed for spa and other services associated with the natural hot springs. If the Desert Hot Springs Sub-basin and the associated hot springs were to become contaminated, the tourism-related business of the Desert Hot Springs community would be substantially impacted.

Therefore, the *Groundwater Quality Protection Program – Desert Hot Springs* would provide economic benefits relating to avoided loss of hotel revenue for the natural hot springs-related tourist industry within the project area. The calculation for estimated lost revenue is based on the Transit Occupancy Tax (TOT) and sales tax revenues for the City of Desert Hot Springs Annual Financial Report from 2009. This report shows that hotel revenue in Desert Hot Springs included $983,416 for TOT revenue in 2009 from a 12% hotel tax, which represents tax collected on hotel revenue of $8,195,133 in 2009. It is assumed that contamination of the natural hot springs would reduce hotel occupancy by 50%. A 50% reduction in hotel occupancy would result in an annual loss of $4,097,567 in hotel revenue.

In total, by preventing contamination within the Desert Hot Springs Subbasin, this project would result in $60,924,686 of total discounted benefits associated with avoiding hotel revenue losses over the fifty-year lifetime of the project as Table 8-15.

Table 8-15: Avoided Loss of Hotel Revenue
Groundwater Quality Protection Program - Desert Hot Springs

	Current Annual Hotel Revenue (2009)	Annual Loss in Hotel Revenue without Project (50%)	Years	Total Cost
Avoided Loss of Hotel Revenue	$8,195,133	$4,097,567	50	$204,878,333
Total Avoided Loss of Hotel Revenues after Discounting				**$60,924,686**

Note: For further information regarding how these costs were reached, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Avoided Loss of Hotel Tax Revenue

As described above, the *Groundwater Quality Protection Program – Desert Hot Springs* would prevent annual losses in hotel revenue in Desert Hot Springs by preventing contamination in the Desert Hot Springs Sub-basin. Avoided losses of hotel tax revenues are directly related to hotel revenue estimates.

It is assumed that without the project there would be an annual loss of $4,097,567 in hotel revenues. The Desert Hot Springs Transit Occupancy Tax (TOT) is 12%, which applies to hotel revenues. Without the project, the TOT would reduce proportionately to the hotel revenue losses, such that the total TOT would be reduced by 12% of $4,097,567or $491,708 per year.

In total, by preventing contamination within the Desert Hot Springs Sub-basin, this project would result in $7,310,962 of total benefits associated with avoiding hotel tax revenue losses over the fifty-year lifetime of the project as shown in Table 8-16.

Table 8-16: Avoided Loss of Hotel Tax Revenue
Groundwater Quality Protection Program - Desert Hot Springs

	Annual Loss in Hotel Revenue without Project	Associated Loss in Hotel Tax Revenue (12%)	Years	Total Cost
Avoided Loss of Hotel Tax Revenue	$4,097,567	$491,708	50	$24,585,400
Total Avoided Loss of Hotel Tax Revenue after Discounting				**$7,310,962**

Note: For further information regarding how these costs were reached, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-17 summarizes the anticipated beneficiaries of water quality and other benefits that would be provided by the project. The water quality and other benefits would be anticipated on a local level to local residents, hotel business owners, and municipalities, as well as on a regional and statewide level to any visitors to the region.

Table 8-17: Project Beneficiaries Summary
Groundwater Quality Protection Program - Desert Hot Springs

Local	Regional	Statewide
Local residents, hotel business owners, and municipalities	Visitors to region	Visitors to region

Project Benefits Timeline Description

This project would provide water quality and other expected benefits beginning in 2011 and continuing in excess of the 50-year Project lifetime.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with project construction will be mitigated through the CEQA compliance process. No long-term adverse effects are expected as a result of the proposed project.

Uncertainty of Benefits

Table 8-18 below demonstrates uncertainties associated with benefits that would be provided by the project. As demonstrated within the table, there are uncertainties related to protecting beneficial uses because they were not monetized. There are also uncertainties related to avoided losses of hotel revenue and hotel tax revenue due to the assumptions that went into these benefit calculations.

Table 8-18: Omissions, Biases, and Uncertainties and their Effect on the Project
Groundwater Quality Protection Program - Desert Hot Springs

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Protecting beneficial uses	+	Not monetized. Without the project, contamination has the potential to migrate downstream to the entire Coachella Valley since the aquifer sits higher in elevation to and drains into the other larger Whitewater basin.
Avoided loss of hotel revenue	+/-	The assumption of a 75 percent reduction in hotel occupancy due to contaminated water is an estimate. The actual rate could be higher or lower.
Avoided loss of tax revenue	+/-	The assumption of a 75 percent reduction in hotel occupancy due to contaminated water is an estimate. The actual rate could be higher or lower. Additional tax revenue would be lost from decreased food, energy, and retail sales.

* Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 4: Groundwater Quality Protection Program-Cathedral City

The water quality and other benefits that are anticipated to result from implementation of the *Groundwater Quality Protection Program – Cathedral City* are summarized below in Table 8-19 and the cost-benefit overview is presented in Table 8-20. This program would result in monetized and qualitative water quality benefits. Detailed cost and benefit information associated with the program, including present value calculations, are provided in Appendix 8-1.

Table 8-19: Water Quality and Other Benefits Summary
Groundwater Quality Protection Program - Cathedral City

Type of Benefit	Assessment Level	Beneficiaries
Water Quality		
Protecting beneficial uses	Qualitative	Local and regional
Avoided wastewater pumping station O&M costs	Monetized	Local
Avoided replacement costs of municipal wells	Qualitative	Local
Avoided replacement and O&M costs to septic tank owners	Monetized	Local

Table 8-20: Water Quality and Other Benefit-Cost Overview
Groundwater Quality Protection Program - Cathedral City

	Present Value ($2009)
Costs – Total Capital and O&M	**$1,760,282**
Monetizable Benefits	
Avoided wastewater pumping station O&M costs	$77,399
Avoided costs to septic tank owners	$784,194
Total	**$861,593**
Qualitative Benefits	**Qualitative Indicator***
Protecting beneficial uses	+
Avoided replacement costs of municipal wells	+

* Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If this project were not implemented, there would be continued and potential further negative impacts associated with failing and/or densely located septic systems within the project area. In addition, DWA would have to continue to pay for O&M of a wastewater pumping station that would no longer be necessary if this project were implemented.

Water Quality and Other Benefits

The proposed project would provide several water quality and other benefits. These benefits are described in detail below.

Protection of Beneficial Uses

Effluent from septic tanks is known to contain relatively high concentrations of nitrate, and ammonia nitrogen, which can leach into the local groundwater, thereby causing increased nitrate concentrations in groundwater. DWA previously removed a groundwater well (Well 19) within the project area from domestic water production due to high nitrate concentrations.

This project would protect the local groundwater from further septic tank effluent leaching, thus protecting the beneficial use of drinking water within and adjacent to the Project area. This benefit has not been quantified and/or monetized.

Avoided Wastewater Pumping Station O&M Costs

Currently, DWA operates a wastewater pumping station within the project area, which would no longer be necessary if this project were implemented. Therefore, this project would result in a monetized benefit that represents the cost of operating and maintaining the pumping station that would be eliminated by construction of this project.

It is estimated that the annual operations and maintenance costs of the pumping station are $5,537. Therefore, the monetized project benefit would include these operations and maintenance costs over the 49-year lifetime of the project. After discounting, these total benefits, which would begin in 2012 and end in 2060, are estimated to be $77,399 in 2009 dollars.

Table 8-21: Avoided Wastewater Pumping Station O&M Costs
Groundwater Quality Protection Program - Cathedral City

	Annual O&M Costs	Years	Total Cost
Wastewater Pump Station Costs	$5,537	49	$271,313
Total Avoided Wastewater Pump Station Costs with Discounting			**$77,399**

Note: For further information regarding how these costs were reached, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Avoided Replacement Costs of Municipal Wells

Effluent from septic tanks is known to contain relatively high concentrations of nitrate, and ammonia nitrogen, which can leach into the local groundwater, thereby causing increased nitrate concentrations in groundwater. DWA previously removed a groundwater well (Well 19) within the project area from domestic water production due to high nitrate concentrations. It is estimated that the cost to replace this well was $1,000,000. In addition, there are no alternate water supplies available in the project area as groundwater is the primary source of drinking water.

If the *Groundwater Quality Protection Program – Cathedral City* were not implemented, other municipal wells may become contaminated and require replacement, which would further threaten the only local water supply source. Benefits associated with avoiding the replacement costs of municipal wells would occur throughout the 49-year lifetime of the project (from 2012 to 2060); however, it is unknown at this time when or how many additional municipal wells would be impacted. These benefits have not been monetized or quantified.

Avoided Costs to Septic Tank Owners

The *Groundwater Quality Protection Program – Cathedral City*, by replacing septic systems with sewer connections, would reduce costs to septic tank owners associated with operations, maintenance, and replacement costs of septic tanks. Economic information regarding costs to septic tank owners was based on estimates from MSWD, and specifically from information regarding the *Groundwater Quality Protection Program – Desert Hot Springs* within this proposal.

The *Groundwater Quality Protection Program – Cathedral City* is anticipated to replace 132 septic tanks with sewer connections. Information from MSWD shows that for typical septic systems, the annualized maintenance costs are $500 for pumping every three to five years, with an average maintenance cost of $125 per year. In addition, the Desert Hot Springs project demonstrates that replacement costs average $10,000 over a 25-year period, or approximately $400 per year. In total the annualized costs to each septic

tank owner is the summation of annual maintenance costs ($125) and annual replacement costs ($400) for a total of $525 per year. This project would replace 132 septic tanks, therefore resulting in an annualized avoided cost of $69,300 per year ($525 x 132).

In addition to the avoided costs, however, the project would also potentially result in costs to septic tank owners associated with a one-time abatement cost for customers to connect to the wastewater collection system. Please note that these costs would be required with or without the project, because mandates from the Colorado River RWQCB require that customers connect to wastewater collection systems once they are available to their property. This one-time abatement cost would be $5,000, but would be annualized over the same time period as the avoided costs noted above (49 years) for an annual total of $100 per year. This project would replace 132 septic tanks, therefore resulting in an annualized cost of $13,200 per year ($100 x 132).

In sum, annualized avoided costs to septic tank owners would be $69,300 per year (for avoided O&M) minus $13,200 per year (for abatement), for a total of $56,100 per year. It is anticipated that these annual benefits would begin in 2012 and end in 2060. After discounting, this total benefit is estimated to be $784,194 over the lifetime of the project.

Table 8-22: Avoided Costs to Septic Tank Owners
Groundwater Quality Protection Program - Cathedral City

	Annual Cost per Unit	Number of Units	Years	Total Cost
Avoided Maintenance Costs	$125	132	49	$808,500
Avoided Replacement Costs	$400	132	49	$2,587,200
Subtotal Avoided Costs to Septic Tank Owners				**$3,395,700**
Abatement Costs	$100	132	49	$646,800
Subtotal Retained Costs to Septic Tank Owners				**$646,800**
Total Avoided Costs to Septic Tank Owners (Delta)				**$2,748,900**
Total Avoided Costs to Septic Tank Owners with Discounting				**$784,194**

Note: For further information regarding how these costs were reached, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-23 summarizes the anticipated beneficiaries of water quality benefits that would be provided by the Project. The water quality benefits would be anticipated on a local level to local residents and groundwater pumpers who utilize groundwater within the Project area.

Table 8-23: Project Beneficiaries Summary
Groundwater Quality Protection Program - Cathedral City

Local	Regional	Statewide
Local residents, hotel business owners, and municipalities	Visitors to region	Visitors to region

Project Benefits Timeline Description

This Project would provide water quality and other expected benefits beginning in 2012 and continuing in excess of the 50-year project lifetime.

Potential Adverse Effects from the Project

No short-term or long-term adverse effects are expected as a result of the proposed project.

Uncertainty of Benefits

Projected savings provided by protecting beneficial uses (drinking water) were not monetized, and therefore the actual monetizable benefit is unknown. However, without the project, nitrate contamination would potentially spread and contaminate the groundwater aquifer within and outside the immediate Project area, providing an even greater benefit than assumed within this analysis. The benefits associated with avoiding replacement costs of municipal wells are also uncertain, because these avoided costs were not monetized. Unknown values for this avoided cost include the number of municipal wells that would be impacted, the annual water production of those wells, and the actual cost to replace each contaminated well. Table 8-24 summarizes the uncertainties associated with these benefits that would be provided by the project.

Table 8-24: Omissions, Biases, and Uncertainties and their Effect on the Project
Groundwater Quality Protection Program - Cathedral City

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Protecting beneficial uses	+	Not monetized. Without the Project, nitrates from septic discharges have the potential to contaminate the aquifer within and outside the immediate Project area.
Avoided replacement costs of municipal wells	++	Not monetized. The number of municipal wells that could potentially be impacted is unknown. The annual water production of municipal wells is also not known. The actual cost to replace each contaminated well could be higher or lower than the estimate.

* Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Appendix 8-1: Economic Analysis Tables

- ✓ **Project 1: Regional Water Conservation Program**

  Table 16 – Water Quality and Other Expected Benefits.....Attached

- ✓ **Project 2: Short Term Arsenic Treatment Project**

  Table 16 – Water Quality and Other Expected Benefits.....Not Applicable

- ✓ **Project 3: Groundwater Quality Protection Program –Desert Hot Springs**

  Table 16 – Water Quality and Other Expected Benefits.....Attached

- ✓ . **Project 4: Groundwater Quality Protection Program –Cathedral City**

  Table 16 – Water Quality and Other Expected Benefits.....Attached

Coachella Valley Integrated Regional Water Management
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Table 16 - Water Quality and Other Expected Benefits (2009 dollars)
Project 1: Regional Water Conservation Program

	(b) Type of Benefit: Avoided wastewater treatment					*(b) Type of Benefit: Water quality improvements related to protecting, restoring or enhancing beneficial uses*					*(b) Type of Benefit: Ecosystem improvements (preservation of habitat of species identified in MSHCP)*					*(b) Type of Benefit: Power Savings*					*Discounting Calculations for Economic Benefits*		
	(C) Measure of Benefit [Unit]: Acre feet					*(C) Measure of Benefit [Unit]: Reduction in runoff (%) [not monetized]*					*(C) Measure of Benefit [Unit]: [Qualitative]*					*(C) Measure of Benefit [Unit]: Reduction in power consumption %) [not monetized]*							
(a) Year	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(h) Total Annual Benefits ($)	(i) Discount Value	(j) Discounted Benefits [h x i]
2009	0.00	0.00	0.00	$270	$0			0		$0			0		$0			0		$0	**$0**	**1.000**	**$0**
2010	0.00	0.00	0.00	$270	$0			0		$0			0		$0			0		$0	**$0**	**0.943**	**$0**
2011	0.00	0.00	0.00	$270	$0			0		$0			0		$0			0		$0	**$0**	**0.890**	**$0**
2012	-993.75	0.00	993.75	$270	$268,313	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$268,313**	**0.840**	**$225,383**
2013	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.792**	**$425,007**
2014	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.747**	**$400,859**
2015	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.705**	**$378,321**
2016	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.665**	**$356,856**
2017	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.627**	**$336,464**
2018	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.592**	**$317,682**
2019	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.558**	**$299,437**
2020	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.527**	**$282,801**
2021	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.497**	**$266,703**
2022	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.469**	**$251,677**
2023	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.442**	**$237,188**
2024	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.417**	**$223,773**
2025	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.390**	**$209,284**
2026	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.371**	**$199,088**
2027	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.350**	**$187,819**
2028	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.331**	**$177,623**
2029	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.312**	**$167,427**
2030	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.294**	**$157,768**
2031	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.278**	**$149,182**
2032	-1,987.50	0.00	1,987.50	$270	$536,625	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$536,625**	**0.262**	**$140,596**
2033	-1,916.52	0.00	1,916.52	$270	$517,460	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$517,460**	**0.247**	**$127,813**
2034	-1,845.54	0.00	1,845.54	$270	$498,295	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$498,295**	**0.233**	**$116,103**
2035	-1,774.55	0.00	1,774.55	$270	$479,129	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$479,129**	**0.220**	**$105,408**
2036	-1,703.57	0.00	1,703.57	$270	$459,964	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$459,964**	**0.207**	**$95,213**
2037	-1,632.59	0.00	1,632.59	$270	$440,799	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$440,799**	**0.196**	**$86,397**
2038	-1,561.61	0.00	1,561.61	$270	$421,634	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$421,634**	**0.185**	**$78,002**
2039	-1,490.63	0.00	1,490.63	$270	$402,469	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$402,469**	**0.174**	**$70,030**
2040	-1,419.64	0.00	1,419.64	$270	$383,304	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$383,304**	**0.164**	**$62,862**
2041	-1,348.66	0.00	1,348.66	$270	$364,138	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$364,138**	**0.155**	**$56,441**
2042	-1,277.68	0.00	1,277.68	$270	$344,973	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$344,973**	**0.146**	**$50,366**
2043	-1,206.70	0.00	1,206.70	$270	$325,808	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$325,808**	**0.138**	**$44,962**
2044	-1,135.71	0.00	1,135.71	$270	$306,643	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$306,643**	**0.130**	**$39,864**
2045	-1,064.73	0.00	1,064.73	$270	$287,478	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$287,478**	**0.123**	**$35,360**
2046	-993.75	0.00	993.75	$270	$268,313	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$268,313**	**0.116**	**$31,124**
2047	-922.77	0.00	922.77	$270	$249,147	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$249,147**	**0.109**	**$27,157**
2048	-851.79	0.00	851.79	$270	$229,982	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$229,982**	**0.103**	**$23,688**
2049	-780.80	0.00	780.80	$270	$210,817	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$210,817**	**0.097**	**$20,449**
2050	-709.82	0.00	709.82	$270	$191,652	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$191,652**	**0.092**	**$17,632**
2051	-638.84	0.00	638.84	$270	$172,487	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$172,487**	**0.087**	**$15,006**
2052	-567.86	0.00	567.86	$270	$153,321	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$153,321**	**0.082**	**$12,572**
2053	-496.88	0.00	496.88	$270	$134,156	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$134,156**	**0.077**	**$10,330**
2054	-425.89	0.00	425.89	$270	$114,991	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$114,991**	**0.073**	**$8,394**
2055	-354.91	0.00	354.91	$270	$95,826	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$95,826**	**0.069**	**$6,612**
2056	-283.93	0.00	283.93	$270	$76,661	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$76,661**	**0.065**	**$4,983**
2057	-212.95	0.00	212.95	$270	$57,496	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$57,496**	**0.061**	**$3,507**
2058	-141.96	0.00	141.96	$270	$38,330	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$38,330**	**0.058**	**$2,223**
2059	-70.98	0.00	70.98	$270	$19,165	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$19,165**	**0.054**	**$1,040**
2060	0.00	0.00	0.00	$270	$0	100%	95%	-5%		$0			0		$0	100%	95%	-5%		$0	**$0**	**0.051**	**$0**
																						Total Present Value of Discounted Benefits over Project Life (Monetized Benefits):	$6,544,473
																						Project Allocation:	100.0%
																						Total Present Value of Discounted Benefits (Monetized Benefits):	**$6,544,473**

Comments: It is estimated that approximately 30 percent of water usage is for indoor use and would create wastewater requiring treatment. Based on recent operational and maintenance data, CVWD estimated that wastewater treatment costs are approximately $270/AF, and that cost is expected to stay relatively constant over time. As such, the total avoided wastewater treatment costs associated with the program are estimated to be $6,544,473 over the 49-year lifetime of the program (from 2012 to 2060). Table 8-4 provided a summary of these avoided wastewater treatment costs.

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Table 16 - Water Quality and Other Expected Benefits (2009 dollars)
Project 3: Groundwater Quality Protection Program - Desert Hot Springs

	(b) Type of Benefit: Avoided replacement and O&M costs to septic tank owners					*(b) Type of Benefit: Avoided well treatment for nitrate contamination*					*(b) Type of Benefit: Protecting, restoring, enhancing benefical uses in the Project Area*					*(b) Type of Benefit: Avoided loss of hotel revenue*					*(b) Type of Benefit: Protection of transient occupancy tax revenue*							
	(C) Measure of Benefit [Unit]: Annual costs ($)					*(C) Measure of Benefit [Unit]: Acre feet per year*					*(C) Measure of Benefit [Unit]: Acre feet per year [not monetized]*					*(C) Measure of Benefit [Unit]: Annual revenue ($)*					*(C) Measure of Benefit [Unit]: Hotel room revenue ($)*					*Discounting Calculations for Economic Benefits*		
(a) Year	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(h) Total Annual Benefits ($)	(i) Discount Value	(j) Discounted Benefits [h x i]
2009																				$0					$0	$0	1.000	$0
2010																				$0					$0	$0	0.943	$0
2011	-1	0	1	$77,775	$77,775	0	0	0	$128	$0	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,667,050	0.890	$4,153,674
2012	-1	0	1	$77,775	$77,775	0	0	0	$128	$0	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,667,050	0.840	$3,920,322
2013	-1	0	1	$77,775	$77,775	0	0	0	$128	$0	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,667,050	0.792	$3,696,303
2014	-1	0	1	$77,775	$77,775	0	0	0	$128	$0	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,667,050	0.747	$3,486,286
2015	-1	0	1	$77,775	$77,775	0	0	0	$128	$0	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,667,050	0.705	$3,290,270
2016	-1	0	1	$77,775	$77,775	-1,775	0	1,775	$128	$226,986	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,894,035	0.665	$3,254,534
2017	-1	0	1	$77,775	$77,775	-1,775	0	1,775	$128	$226,986	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,894,035	0.627	$3,068,560
2018	-1	0	1	$77,775	$77,775	-1,775	0	1,775	$128	$226,986	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,894,035	0.592	$2,897,269
2019	-1	0	1	$77,775	$77,775	-1,775	0	1,775	$128	$226,986	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,894,035	0.558	$2,730,872
2020	-1	0	1	$77,775	$77,775	-2,367	0	2,367	$128	$302,648	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,969,697	0.527	$2,619,031
2021	-1	0	1	$77,775	$77,775	-2,367	0	2,367	$128	$302,648	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,969,697	0.497	$2,469,940
2022	-1	0	1	$77,775	$77,775	-2,367	0	2,367	$128	$302,648	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,969,697	0.469	$2,330,788
2023	-1	0	1	$77,775	$77,775	-2,367	0	2,367	$128	$302,648	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,969,697	0.442	$2,196,606
2024	-1	0	1	$77,775	$77,775	-2,367	0	2,367	$128	$302,648	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,969,697	0.417	$2,072,364
2025	-1	0	1	$77,775	$77,775	-2,367	0	2,367	$128	$302,648	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$4,969,697	0.390	$1,938,182
2026	-1	0	1	$77,775	$77,775	-3,550	0	3,550	$128	$453,972	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,121,021	0.371	$1,899,899
2027	-1	0	1	$77,775	$77,775	-3,550	0	3,550	$128	$453,972	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,121,021	0.350	$1,792,357
2028	-1	0	1	$77,775	$77,775	-3,550	0	3,550	$128	$453,972	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,121,021	0.331	$1,695,058
2029	-1	0	1	$77,775	$77,775	-3,550	0	3,550	$128	$453,972	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,121,021	0.312	$1,597,759
2030	-1	0	1	$77,775	$77,775	-3,550	0	3,550	$128	$453,972	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,121,021	0.294	$1,505,580
2031	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.278	$1,549,848
2032	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.262	$1,460,648
2033	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.247	$1,377,023
2034	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.233	$1,298,973
2035	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.220	$1,226,498
2036	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.207	$1,154,024
2037	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.196	$1,092,699
2038	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.185	$1,031,374
2039	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.174	$970,049
2040	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.164	$914,299
2041	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.155	$864,124
2042	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.146	$813,949
2043	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.138	$769,349
2044	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.130	$724,749
2045	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.123	$685,724
2046	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.116	$646,699
2047	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.109	$607,674
2048	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.103	$574,224
2049	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.097	$540,774
2050	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.092	$512,899
2051	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.087	$485,024
2052	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.082	$457,149
2053	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.077	$429,274
2054	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.073	$406,974
2055	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.069	$384,675
2056	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.065	$362,375
2057	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.061	$340,075
2058	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.058	$323,350
2059	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.054	$302,657
2060	-1	0	1	$77,775	$77,775	-7,100	0	7,100	$128	$907,943	0	7,100	7,100		$0	-1	0	1	$4,097,567	$4,097,567	4,097,567	8,195,133	4,097,567	12%	$491,708	$5,574,993	0.051	$285,526
Total Present Value of Discounted Benefits over Project Life (Monetized Benefits):																												$75,208,333
Project Allocation:																												100.0%
Total Present Value of Discounted Benefits (Monetized Benefits):																												**$75,208,333**

Narrative description of benefit: *Area D-1 (the proposed project area) is included in and part of our phased project for sewers know as AD-12. Of the 6000 septic tanks in AD-12 , Area D-1 will constitute 183 septic tanks that will be converted over to sewer, and equivalent to the following avoided costs. Approximately 183 septic systems with annualized maintenance costs of $200 ($500 pumping every 3 to 5 years or 500/4 = $200/yr.) and replacement costs of $400/yr. ($10,000 avg. cost over 25 yr.s) or 200 + 400 = $600/yr. x 183 customers = $109,800/yr vs. a one-time abatement cost annualized over the comparable period at (avg. $5,000 over the same 25 yr. period = $200/yr.) $200 x 183 customers or $36,600/yr. Avoided costs are 109,800 – 36,600 = $73,200/yr*
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Narrative description of benefit: *The basis for the$371,000 is as follows: $328,000 O & M costs from the AECOM Scenario for Materials and Labor annually (288k/yr. Mat + 40K/yr. Labor)*
+ $42,900 (annual depreciation/replacement cost of the estimated initial capital cost of $857,000 over 20 yrs.)
= $371,000 rounded up
per unit cost of treatment is $371,000/Yr/2900 AFY = $127.93/AF*
*This is the cost for 2 district wells equivalent to the AECOM 3500 gpm scenario with annual production for two wells in 2009 of *2900 AFY, not 219 AFY as previously shown.*
(MSWD 2009 production data - Well 22 @ 1600 gpm and 1100 AFY + Well 29 @ 1700 gpm and 1800 AFY or 3300 gpm collectively @ 2900 AFY production).
The District has ten production wells in the MCSB. If all wells (similar to wells 22 & 29) were affected the per well costs of 2 wells at 371,000 or 185,500 per well is multiplied by all wells (10) the resulting annual cost is $1.9M (185,500 x 10 = 1,855,000).

Narrative description of benefit: *If the entire basin (1.4MAF) is affected the costs for treatment will be substantial & this aquifer feeds into the Whitewater basin with potential to spread the contamination to the entire Coachella Valley.*

Narrative description of benefit: *$983,416 TOT from 2009 divided by 12% Hotel Tax =$8,195,133 Hotel Revenue divided by $140/day avg. hotel room cost= 58,537 days x double occupancy = 117,073 days minus 50% for ntirate contamination = 58,536.5 days or an impact difference of 58,536.5 days eqivalent to $4.1 M annually in lost revenue to hotels .*

Narrative description of benefit: *20% of the current visitor TOT and community sales tax revenues projected to be lost through reduced tourism= - $197K/yr. If the hot water basin is contaminated, the DAC's # 1 community economic engine will be damaged. 22 businesses in Desert Hot Springs are directly marketed for their Hot Mineral Water.*

Comments: *Sources of information: MSWD 2005 UWMP. AECOM Nitrate Treatment Scenario. 2009 City of Desert Hot Springs Financial Statement (TOT $983,416 + sales tax $5,386,302 combined = $6,369,718 or $6.4 million)*

Coachella Valley Integrated Regional Water Management
Implementation Grant Proposal
Appendix 8-1

Table 16 - Water Quality and Other Expected Benefits (2009 dollars)
Project 4: Groundwater Quality Protection Program - Cathedral City

	(b) Type of Benefit: Improvements related to protecting, restoring or enhancing beneficial uses					*(b) Type of Benefit: Avoided wastewater pumping station O&M costs*					*(b) Type of Benefit: Avoided replacement costs of city wells*					*(b) Type of Benefit: Avoided O&M and replacement costs to septic tank owners*					*Discounting Calculations for Economic Benefits*		
	(C) Measure of Benefit [Unit]: [Qualitative]					*(C) Measure of Benefit [Unit]: Annual cost ($)*					*(C) Measure of Benefit [Unit]: [Qualitative]*					*(C) Measure of Benefit [Unit]: Annual cost ($)*							
(a) Year	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(h) Total Annual Benefits ($)	(i) Discount Value	(j) Discounted Benefits [h x i]
2009			0		$0			0		$0				$1,000,000	$0						**$0**	**1.000**	**$0**
2010			0		$0			0		$0				$1,000,000	$0						**$0**	**0.943**	**$0**
2011			0		$0			0		$0				$1,000,000	$0						**$0**	**0.890**	**$0**
2012			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.840**	**$51,775**
2013			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.792**	**$48,817**
2014			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.747**	**$46,043**
2015			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.705**	**$43,454**
2016			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.665**	**$40,989**
2017			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.627**	**$38,646**
2018			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.592**	**$36,489**
2019			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.558**	**$34,393**
2020			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.527**	**$32,483**
2021			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.497**	**$30,634**
2022			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.469**	**$28,908**
2023			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.442**	**$27,244**
2024			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.417**	**$25,703**
2025			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.390**	**$24,038**
2026			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.371**	**$22,867**
2027			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.350**	**$21,573**
2028			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.331**	**$20,402**
2029			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.312**	**$19,231**
2030			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.294**	**$18,121**
2031			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.278**	**$17,135**
2032			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.262**	**$16,149**
2033			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.247**	**$15,224**
2034			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.233**	**$14,361**
2035			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.220**	**$13,560**
2036			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.207**	**$12,759**
2037			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.196**	**$12,081**
2038			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.185**	**$11,403**
2039			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.174**	**$10,725**
2040			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.164**	**$10,108**
2041			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.155**	**$9,554**
2042			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.146**	**$8,999**
2043			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.138**	**$8,506**
2044			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.130**	**$8,013**
2045			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.123**	**$7,581**
2046			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.116**	**$7,150**
2047			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.109**	**$6,718**
2048			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.103**	**$6,349**
2049			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.097**	**$5,979**
2050			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.092**	**$5,671**
2051			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.087**	**$5,362**
2052			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.082**	**$5,054**
2053			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.077**	**$4,746**
2054			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.073**	**$4,500**
2055			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.069**	**$4,253**
2056			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.065**	**$4,006**
2057			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.061**	**$3,760**
2058			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.058**	**$3,575**
2059			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.054**	**$3,346**
2060			0		$0	-1	0	1	$5,537	$5,537	0	0	0	$1,000,000	$0	-1	0	1	$56,100	$56,100	**$61,637**	**0.051**	**$3,157**

Total Present Value of Discounted Benefits over Project Life (Monetized Benefits):	$861,593
Project Allocation:	100.0%
Total Present Value of Discounted Benefits (Monetized Benefits):	**$861,593**

Narrative description of benefits: *Septic tank effluent contains relatively high concentrations of nitrite/nitrate and ammonia nitrogen. These leach into the groundwater resulting in increased nitrate concentrations in groundwater. Desert Water Agency removed Well 19 from domestic water production due to high nitrate concentrations.*

Narrative description of benefits: *Value of benefit represents the cost of operating and maintaining the pumping station that will be eliminated by construction of this project.*

Narrative description of benefits: *Septic tank effluent contains relatively high concentrations of nitrite/nitrate and ammonia nitrogen. These leach into the groundwater resulting in increased nitrate concentrations in groundwater. Desert Water Agency removed Well 19 from domestic water production due to high nitrate concentrations..*

Narrative description of benefits: *Elimination of septic tanks is a priority for the Colorado River Regional Water Quality control Board.*

Comments: